



# Life and Death of Roscas : If Power Corrupts, Does Powerlessness Make One Blameless ?

Olivier Dagnelie

## ► To cite this version:

Olivier Dagnelie. Life and Death of Roscas : If Power Corrupts, Does Powerlessness Make One Blameless ?. 2007. halshs-00077968v2

**HAL Id: halshs-00077968**

**<https://shs.hal.science/halshs-00077968v2>**

Preprint submitted on 10 Jun 2007

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Life and Death of Roscas : If Power Corrupts, Does Powerlessness Make One Blameless ?\*

Olivier Dagnelie<sup>†</sup>  
CRED, University of Namur

February 2007

## Abstract

We have very few ideas as to what factors can influence the duration of roscas and reduce their failure risk. In this research, we bring new light on these empirical questions using an original data set containing information on living and dead roscas from Cotonou, Benin. We notice that the groups run by a president alone are more likely to fall apart. We also present evidence that individuals attracted to this type of groups have a lower social capital and therefore might be more likely to default.

## 1 Introduction

A ROTating and Savings Credit Association is an informal saving group. At each meeting of the group, the fixed contributions are gathered from each member. The whole amount of the collected money, what is called the pot, is then given to one of the members according to a predefined rule of the group: lottery draw, decision by the ruling body, bidding process. Each member has to go on contributing until every one has received the pot, which marks the end of the cycle. One immediately perceives that members might be tempted to try to get the pot at the very beginning of the cycle and then stop contributing. This creates important incentive problems. The challenge of this kind of group is therefore to make everyone contribute until the end of the cycle.

The default problem is of primary importance in the context of roscas and is often acknowledged in the literature. In that matter, several papers study the role of the rosca leader (president of the group) in the sustainability of the group. Kurtz (1973) evokes the fact that as the president receives the first payment<sup>1</sup>, he must pay off<sup>2</sup> the members of the group if something goes wrong

---

\*I would like to thank the CRED (University of Namur) and the National Bank of Belgium for financial support. I am deeply grateful to Philippe LeMay. Thanks are also due to Jean-Marie Baland, Namur seminars and NEUDC 2006 participants for helpful comments. I also wish to thank our team of enumerators: Félicité Chadare, Maurille Gandemey, Shadia Gbaguidi, Calixte Houedey, Euphrem Lankoutin, Pierre Meliho, Raoul Tchiakpe and particularly Charlemagne Tomavo. The tedious encoding process was done with the help of Amélie Bodson and Gaëtan Dagnelie. Special thanks to Yvonnka Kelly-Dagnelie.

<sup>†</sup>e-mail: olivier.dagnelie@fundp.ac.be

<sup>1</sup>In 36.4% of the roscas of our sample, the time of pot reception of the ruling body is stated in the rules of the group. In 97.7% of these cases, they receive the pot at the very beginning of the cycle.

<sup>2</sup>Not fulfilling his obligations would tarnish his reputation and prevent him from going on running roscas.

and is often the only one to lose money. This is also brought up by Bouman (1995) who claims that in many countries the organizer is paid because running a rosca has almost become a profession. As the role of the president is to minimize the risk of default, according to van den Brink and Chavas (1997), the best incentive scheme is to have him receive the last pot making him the residual claimant. Handa and Kirton (1999) provide a detailed analysis of the rosca leader in which they consider the 'banker' to be the internal governance structure minimizing transaction costs. They confirm his role of risk minimizer as lender of last resort, since either he receives the pot at the end of the cycle or he keeps the pot to cover a potential default. They claim a sole individual making decisions for the group is more efficient than trying to reach a consensus among the whole group. We fear however that, as Lord Acton put it: "Power tends to corrupt, and absolute power corrupts absolutely". There is probably a trade-off between the efficiency gains coming from having only one decider and the losses due to misuse of power or mismanagement. We therefore think that an intermediary solution such as a committee of rulers sharing responsibilities would probably be more efficient. One of Handa and Kirton's main results is that paying the president for running the rosca diminishes the risk of experiencing problems<sup>3</sup> in the group, hence enhancing sustainability<sup>4</sup>.

After being loosely mentioned several times in the literature, the issue of randomness of the attribution of ranks has been evoked by Handa and Kirton who show that it diminishes the probability of experiencing problems in one's rosca. Actually, random roscas demonstrate the advantage of being fair and not prone to subjectivity or favouritism as to the rank allocation, which can lead to bitter conflicts. As Anderson, Baland and Moene (2004) put it, this method of allocation is preferred by the majority of members as each one has the same probability of receiving the pot early in the cycle<sup>5</sup>. It has however the drawback of not optimally giving the pot to the one the more in need and, according to Anderson et al., of exacerbating the incentives to default. This implies that agents taking part in such groups have to be more vulnerable to social sanctions for the rosca to be sustainable. Our data analysis shows that there is no significant correlation between randomness and the probability of group failure<sup>6</sup>.

As to the complete falling apart of roscas, references are quite rare. Bouman (1995) quotes the paper of Wu (1974) bringing up the case of organizers of *Huis* disappearing with the money in Papua New Guinea at the time of independance while Anderson, Baland and Moene (2004) touch on the problems of cheating and the lack of money to contribute. These papers are however of little help regarding the question we are interested in as they do not deal with the specific topic of group failure and the factors reducing or enhancing the duration of roscas.

Recent advances in the literature deal with the sustainability and the stability of the agreement between the members of such a group. Anderson, Baland and Moene make clear that without

---

<sup>3</sup>10% of the members in their sample experienced problems in their group while 26% did in our sample. Interestingly, only 1.5% of the members of their sample reported a delinquent president whereas there was 3.3% in our case.

<sup>4</sup>If we admit 'experiencing problems' seems to be a good proxy of the non sustainability of a rosca, the way the group tackles problems is also likely to be an important factor influencing the duration of the group. The latter is probably linked to the organizational design of the group.

<sup>5</sup>They also prove that multiplicative discounting implies that the majority of members strictly prefers the allocation of ranks to be random.

<sup>6</sup>When we ran duration analyses with this independant variable, it never was significant. However t-tests on means differences reveal that problems and losses of money are less frequent in random roscas and that committee groups significantly use more frequently this method of pot allocation. As to the membership of these groups, we cannot be as categorical as Anderson et al.

social sanctions and contracts, roscas are bound to fail as the first member to receive the pot has no incentives preventing him from leaving the group. As for Ambec and Treich (2007), they point out that, if people suffer from self-control problems and contracts are binding<sup>7</sup> - which might be regarded as a strong hypothesis in such an environment - roscas are stable financial agreements. Basu's plausible assumption (2006) of rosca members being hyperbolic discounters<sup>8</sup>, proves that even in the absence of social sanctions and contracting, roscas can be effective commitment saving devices.

Beyond the differences related to the order fixing process, and the more trivial differences related to the frequency of the meetings, the amount of the contribution, or the number of members, what is striking is the extent to which groups can differ due to the ruling structure of the group. From our field observations, we can distinguish two kinds of groups: those run by a president alone - president groups - and those led by a committee consisting of a president, treasurer, secretary, etc - committee groups. The former case refers to a group the sole function of which is to render a financial service. It is typically run by someone who decides to set up an association hoping it is going to provide him a means of saving and living<sup>9</sup>. In the latter case, becoming a committee member depends on the members' will. It is considered to be an honour which does not bring much advantage beyond social esteem. This kind of group serves different functions: primarily of saving vehicle but also of socializing opportunity. These roscas are more cohesive as demonstrated by tests of means differences on the possibility of getting credit, solidarity help, on the proportion of groups having other activities (indemnity funds, dancing and chanting, meals, etc.).

During the survey, we noticed that ex-members of groups run by a president alone often complained about their past experiences in such roscas. Moreover they tended to have lost money in the ending process of the group. That is why we are going to verify if our intuition as to the risk enhancing nature of a single person management is confirmed by the reality of the field. We begin by providing a brief description of our survey in section 2. Descriptive statistics about reasons given for the group stopping are displayed in section 3. These lead us to restrict our sample to groups which stopped without consensus of all the members. Section 4 deals with the typology of groups and addresses the question as to the actual differences between these two kinds of groups in terms of functioning and regulation. In section 5 we present a survival analysis on the groups which fell apart without consensus of the whole membership or because of undesirable events. As we demonstrate that groups run by a president alone are more likely to end, we turn, in section 6, to the motives for joining the more risky president groups. Logit regressions show that individuals having a low social capital or a high opportunity cost of time are attracted to this kind of groups. Section 7 therefore concludes that even if president groups are more likely to fall apart, we cannot discriminate between failures caused by the organizational structure of the group or by its riskier membership.

---

<sup>7</sup>The latter implies defaulting is not possible (or at infinite cost). There is therefore no need for social sanctions in this framework.

<sup>8</sup>Recent papers on participation to rosca tend to suggest that it is frequently one of the possible reasons to join. See Gugerty (2007), Ashraf, Karlan and Yin (2006) and Dagnelie and LeMay (2005) among others.

<sup>9</sup>Even if most of them are being paid for managing the group, these presidents can not be considered to be professional.

## 2 Description of our Survey

We use data we collected in 2004 in the two districts of Vossa and Enagnon located on the outskirts of Cotonou, about 1.1 million of inhabitants. These areas are known to the city's authority to be the poorest. Vossa is located near an inner bay of fresh water and accommodates a community of fishermen. Enagnon encompasses an adjacent slum called Enagnon-Plage which is inhabited by a majority of fishermen living in huts on the beach. Vossa and Enagnon are near downtown Cotonou where a large part of the inhabitants work and commute everyday. No formal saving and investment institutions, neither public nor private, such as banks and NGOs are present in these two districts. The choice of these zones goes back to a first mission in 2002, which revealed that many informal groups such as indemnity funds and roscas were active there.

During the first three months of 2004 we surveyed 496 households: 110 in Vossa and 386 in Enagnon, of which 116 are located in Enagnon-Plage. The selection of each household was done randomly. The first wave of interviews aimed at creating contacts, getting housing characteristics and obtaining information on each member: religion, activity, education, work, etc. For all members older than fifteen, we required enumerators to fill in a form concerning their expenses on durable goods for the last six months and to carefully report their expenses on non-durable goods during one week. A second round was needed for members of informal groups. During this visit enumerators collected detailed information on all the current and former group(s) they belong(ed) to. We heavily emphasized the importance of privacy and all parts of the questionnaire were filled in the presence of the concerned household member alone. For a maximal accuracy, all members of each household were interviewed separately throughout the successive waves of our survey so that tricky issues related to expenses or income were only tackled privately. Particular attention was thus put on confidentiality which was strictly followed by our enumerators.

All the 496 households we surveyed represent 2083 individuals, 894 of which are under sixteen. We are thus left with a sample of 1179 individuals divided in 604 women and 575 men. We collected information on 242 roscas among which 192 were alive and 50 dead.

We only have material on the interrogated individuals and the groups they joined (structure, functioning, problems encountered, etc) but lack information about the other members or president of the group who were not interviewed. It would thus be misleading to infer from these pieces of information the mean level of income or education of the members of the group. As people were interrogated once about their participation in groups which do not necessarily exist anymore, these are retrospective flow sampling data<sup>10</sup>.

## 3 Given Reasons for Group Stopping

From Table 1, one can immediately notice that the first two reasons given refer to a decision prior to the group stopping. Members of the groups had agreed to stop the group once everybody had a motorbike or after a number of cycles. Then it appears that 11 groups disbanded following the departure of several of their members who moved to another part of Benin or to another job. It is apparently totally exogenous to the organizational structure or functioning of the roscas. The 13 associations in question can therefore be removed from the sample of dead groups to study.

---

<sup>10</sup>The oldest groups of our sample began in the 1960's. The flaws of such a sampling method are taken into account in the survival analysis. We introduced dummies for starting dates and did robustness checks on shorter samples by removing the oldest observations.

	Total	President Alone Loss of Money		Committee Loss of Money	
Do not want to take part any more	0.02	0	0	0.02	0
Everybody has a motorbike	0.02	0	0	0.02	0
Members' departure	0.22	0.06	0	0.16	0
Group ended by the president	0.04	0.02	0	0.02	0
Rosca interrupted	0.06	0.02	0	0.04	0
Death of committee members	0.08	0.06	0.04	0.02	0
Problems related to the pot	0.32	0.14	0.06	0.18	0.08
Theft by the president	0.12	0.10	0.10	0.02	0.02
Theft or dishonest behaviour	0.10	0.06	0.06	0.04	0.04
No respect of the rules	0.02	0	0	0.02	0
Sum	1	0.46	0.26	0.54	0.14
Observations	50	23	13	27	7

Table 1: Given Reasons for Group Stopping.

The next two reasons given concern a decision made by the ruling body to stop or interrupt<sup>11</sup> the association. It is likely that some of the members have been bothered by such a move as the groups ceased their activities without consensus of the whole membership. However, as in all the previously mentioned cases, no member of these organizations seems to have lost money. These cases of roscas ending suddenly prompt us to keep three subsamples of 48, 37 or 32 ended groups for the rest of the study.

Not a single dead rosca and only four alive groups stated in their rules the duration of the group. Moreover, only 7.4%<sup>12</sup> of the 242 roscas include at least one member who before joining had decided how many cycles she wanted to take part in. As a very large majority of members did not want the rosca to stop, it seems reasonable to consider all the 37 or 32 dead groups to have undergone an inefficient stopping.

Furthermore, a close look at Table 1 reveals that 13 roscas run by a president alone and 7 by a committee caused loss of money to at least one of their members. The difference of proportion is significant<sup>13</sup> unless we restrict the size of the sample to the 37 or 32 dead groups. It means that 20 out of the 37 (54.1%) or 32 (62.5%) group failures implied a loss of money for at least one of their members.

One can note that the consequences of the death of a committee member are more serious when the president is the only one to lead the rosca. Money problems concern a large majority of the given causes of group failure. 'Problems related to the pot' refers to the irregular payments

<sup>11</sup>These roscas were interrupted and did not start a new cycle since then. Each of them is considered dead by the interrogated member.

<sup>12</sup>The proportion reaches respectively 12% and 6.3% among the dead and alive roscas. However, this difference of proportion is not significant at 10%. The similar difference between president and committee groups is not significant either.

<sup>13</sup>The significance of the difference remains on a subsample of ex-members of rosca - i.e. members whose rosca died or who left before the group stopped functioning.

leading to unequal pots, pots in several instalments<sup>14</sup> or wrong timing of the pot reception. 'Theft or dishonest behaviour' concerns the cases where the member decides to leave the group and not to contribute any more after receiving the pot. 'Theft by the president' refers to the president leaving with the members' contributions<sup>15</sup>.

Even if these reasons cannot be taken for granted, it seems plausible that the rosca deaths looked at in the subsamples of 37 and 32 groups are inefficient and bring about welfare losses for their members.

## 4 President versus Committee Management

Field observations led us to remark that ex-members of president roscas tended to complain about their past experiences. This brought us to objectivize those impressions in terms of undesired mortality of groups. 23 out of 48 dead groups (47.9%) were run by a president alone - these groups represent 9.6% of the whole sample of roscas - in contrast with 58 out of 192 living groups (30.2%). As exhibited in Table 2, a t-test shows that the difference of proportion is significant at 5%. If we look at groups run by a president alone, 28.4% died (23/81) while 15.7% (25/159) of the groups managed by a committee underwent the same fate. The difference is also significant at 5%. This is highly telling as starting dates reveal there is no time-trend in the creation of president or committee roscas. These results hold with the subsample of 37 and 32 dead associations as presented in Table 2. This quite puzzling evidence incites us to investigate further the features of these two kinds of groups which show two very different modes of functioning.

On the one hand, in the former case, all the decisional power is concentrated in the hands of one single person whereas in the latter case, several people share the responsibilities related to the organization of a group. This can be concluded by looking at who is going to decide if a potential member will be allowed to join the group, if the order of receiving the pot can be changed in case of a member's request and if a member is going to be excluded. In president groups, all these decisions tend to be made by the president only whereas the committee or even all the members would be able to take part in the decision process in committee groups. This may bear important consequences as the group is more vulnerable to the problems related to the president if he is dealing alone. The latter can die, fall ill, steal the contributions or mismanage the group, which can prove fatal for the group.

On the other hand, the rules are less participation oriented or conducive to questioning decision-making power in president groups than in committee groups. This can be illustrated by several variables displayed in Table 2. In this table, one can observe that rules of the group are most of the time only oral in associations managed by a president alone. We guess it reduces the ability of members to go against the president's decisions. Furthermore, attendance to meetings does not seem to be compulsory in president groups contrarily to committee ones. This probably renders the members' opposition weaker as they might not be aware of the decisions made by the president and not know the other members of the association. Moreover, ruling members are not elected in roscas run by a president alone as most of the time the latter created the association

---

<sup>14</sup>It can be highly undesirable if rosca members suffer from self-control problems and use the group as a means to discipline themselves to save.

<sup>15</sup>Contrarily to common beliefs, a lot of roscas keep money in a cashbox - it is the case for 95.9% of the groups of our sample - coming from fines, deposits, share of the pots, etc. This money is mainly used to make loans, to organize a party or to pay the wage of the group's manager.

and devised its rules. Eventually, most of the groups claim for a part of the pot to be kept in the cashbox which also contains the fines paid. This amount of cash is often redistributed on the occasion of a party<sup>16</sup> at the end of the cycle in case of committee groups, whereas in president groups, the leader is likely to keep it as a wage for the financial service rendered to the members of the group. Despite being formally paid more often than committee members, the president alone, being the only residual claimant on the leftover funds of the rosca, has the ability to grant himself some financial advantage<sup>17</sup>. These pieces of information confirm the impression that the ruling position is only honorary for committee members while it can offer financial advantages to presidents running the rosca alone.

Two main components can thus be clearly distinguished from those differences: power and checks and balances. What we mean by 'checks and balances' is an analogy to the system created to prevent abuse of power in democracy. It is the right to control the way power is exerted and the ability to limit its misuses. In our setting it refers to questions concerning the existence of written rules, the election of the ruling member, the compulsory attendance and the sharing of the leftover funds.

As the available data were all categorical, we turned to multiple correspondence analysis<sup>18</sup> (MCA) to get composite indices summarizing these trends. With the help of this technique, we noticed that all four 'checks and balances' variables present the same pattern, contrarily to the four 'power' variables which also share common characteristics. We therefore created a 'checks and balances index' considering the four variables conveying the members' counterbalance to the power of the ruling body of the rosca. We also built a 'power of the president index' summarizing the four variables related to the power exercised by the president of the group. The higher the value of these two negatively correlated indices ( $\rho = -0.61$ ), respectively the stronger the checks and balances and the power of the president. All eight variables can also be summarized in a single dimension of the analysis.

The latter index (MCA 8) is constructed in such a way that the stronger the president's power and the weaker the checks of the members, the higher the value of the index. Another index conveying the same message was generated by summing up all 8 dummies<sup>19</sup>. Tests of means differences associate quite significantly a high value of the MCA index (or the sum of 8 dummies index) with two features: a one president rosca and a dead group.

---

<sup>16</sup>This kind of event is one of the numerous means at the disposal of the leaders to diminish the incentives to default by strengthening social cohesion.

<sup>17</sup>The few following statistics give a clear description of this phenomenon : 87% of the president in committee groups are not paid while they are 42% in president groups. 72% of the committee groups share the leftover funds at the end of the cycle against 20% of the president groups. If we cross those two pieces of information, we see that only 12% of the presidents alone neither get a wage nor the leftover funds of the cycle whereas 64% of their counterparts in committee benefit.

<sup>18</sup>While conventional factor analysis determines which variables cluster together, multiple correspondence analysis determines which category values are close together.

<sup>19</sup>We had to transform our 4 checks and balances dummies and give them a value of 1 when they conveyed a message of low counterbalance.



∞

	Mean	Committee		President		Difference		Living rosca		Dead rosca		Difference	
Existence of written rules	0.541	0.696	(0.036)	0.235	(0.047)	0.461	***	0.604	(0.035)	0.300	(0.065)	0.304	***
Election of the ruling member	0.694	0.857	(0.028)	0.370	(0.054)	0.487	***	0.745	(0.032)	0.500	(0.071)	0.245	***
Compulsory attendance	0.463	0.553	(0.039)	0.284	(0.050)	0.269	***	0.479	(0.036)	0.400	(0.070)	0.079	
Sharing of the leftover funds	0.545	0.720	(0.035)	0.198	(0.045)	0.523	***	0.578	(0.036)	0.420	(0.071)	0.158	**
Checks and balances mca index	0	0.304	(0.040)	-0.604	(0.055)	0.907	***	0.086	(0.046)	-0.329	(0.090)	0.414	***
Group run by a president alone <sup>1</sup>	0.338							0.302	(0.033)	0.479	(0.073)	-0.177	**
Group run by a president alone <sup>2</sup>	0.341							0.302	(0.033)	0.541	(0.083)	-0.238	**
Group run by a president alone <sup>3</sup>	0.339							0.302	(0.033)	0.563	(0.089)	-0.260	***
President decides to accept new members	0.302	0.056	(0.018)	0.790	(0.046)	-0.734	***	0.266	(0.032)	0.440	(0.071)	-0.174	**
President decides to exclude members	0.252	0.062	(0.019)	0.630	(0.054)	-0.568	***	0.224	(0.030)	0.360	(0.069)	-0.136	*
President decides to change the order	0.194	0.062	(0.019)	0.457	(0.056)	-0.395	***	0.172	(0.027)	0.280	(0.064)	-0.108	
Power of the president mca index	0	-0.511	(0.024)	1.016	(0.066)	-1.527	***	-0.068	(0.059)	0.260	(0.124)	-0.327	**
MCA index (8 variables)	0	-0.423	(0.023)	0.840	(0.045)	-1.263	***	-0.074	(0.048)	0.285	(0.097)	-0.359	***
Sum of 8 dummies index	2.839	1.354	(0.096)	5.790	(0.165)	-4.436	***	2.557	(0.173)	3.920	(0.349)	-1.363	***
Death of the group <sup>1</sup>	0.200	0.157	(0.029)	0.284	(0.050)	-0.127	**						
Death of the group <sup>2</sup>	0.162	0.113	(0.026)	0.256	(0.050)	-0.144	**						
Death of the group <sup>3</sup>	0.143	0.095	(0.024)	0.237	(0.049)	-0.142	**						
Observations		161		81		242		192		50		242	

<sup>1</sup>: Out of 48 dead groups: 2 groups terminated by consensus of the members

<sup>2</sup>: Out of 37 dead groups: 11 groups terminated by members' departure (exogenous cause)

<sup>3</sup>: Out of 32 dead groups: 5 groups terminated by decision of the president or unexpected obstacle for the president

Standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 2: T-tests of means differences.

All the intuitions presented above are confirmed by tests of difference of means (or proportions) as shown in Table 2. Differences of proportion of variables related to 'checks and balances' (the first group of variables) are positive and significant. This means that a significantly larger proportion of committee / living<sup>20</sup> groups present the ability for their memberships to check and limit the power of the leader of the group. When variables convey the power dimension of the president, the differences of means between committee and president (or living and dead) groups are significantly negative<sup>21</sup>. This expresses that the power concentration is weaker in committee groups than in the ones where the president rules alone. One can note that the differences between committee and president groups are systematically bigger than those between living and dead roscas. It would therefore not be surprising that other factors might influence the failure of groups.

All the variables, presented in Table 2, confirm that the president is far more powerful in groups where he is the only leader: he is the only one to make the main decisions and is hardly accountable for his deeds towards his membership. Those variables also strengthen our intuitions as to the risk incurred by the members of president groups to experience an unwanted end of their rosca. We must however turn to an econometric model to be able to claim that, by controlling for some characteristics of the groups, the survival probability of roscas is significantly lower under this organizational structure.

## 5 Survival Analysis

In order to perceive what factors could reduce or enhance the risk of dying for a group, we have to turn to a survival analysis. Cox proportional hazard model, which is in continuous time, allows to capture the influence of covariates on the risk of dying. As we used retrospective flow sampling and asked about duration in months, it seems more appropriate to work with grouped data in discrete time, which implies we have to use a complementary log-log transformation of Cox model<sup>22</sup>, being of the following form :

$$\log(-\log(1 - F(t|x))) = x'\beta + \log \Lambda(t) \quad (1)$$

We have thus a complementary log-log regression where the baseline hazard,  $\log \Lambda(t)$ , is designed to be fully non parametric with a binary variable for each interval of constant hazard. We created the dummy variables in such a way that there is at least a failure in each interval. As most of the groups of our sample are still alive, we have censored data which we are taking into account. Given the groups have different starting dates, we introduced dummy variables grouping together several points in time when the roscas were created.

With this technique, and by controlling for a set of characteristics, we are going to test the impact of the checks and balances and power of the president features on the survival probability of beninese roscas. However, as endogeneity problems are not solved, our results will have to be interpreted as correlations. Even if causal relations might be suspected we will never be able to prove these. Several sources of endogeneity are identified : non-randomness of the group rules and membership. We are indeed in the presence of auto selection as people chose the groups they

---

<sup>20</sup>The only proportion difference which is not significant concerns 'compulsory attendance' to the meetings of the rosca.

<sup>21</sup>Except for the decision being related to a change of reception order.

<sup>22</sup>See Appendix 8.3 for further details.

will join, even if some individuals are probably constrained in their choice. Because members are not randomly distributed among groups, differences of public could (and do) influence roscas sustainability. The same principle applies to the non-randomness of rules. As people decide which rules and sanctions are to be followed in the group and we cannot capture this effect, we are not able to isolate pure marginal effects. Since endogenous systematic differences of public and / or rules could influence the functioning of the group, we are unable to establish that the organizational structure has an impact on the duration of roscas.

To get the purest correlations possible, we introduce control variables describing which relationship existed between the people who joined the group at its creation (the first five variables), whether the group is composed exclusively of women or mixed and if all the members come from the same ethnical group. Then we use four different formulations to test the relevance of our assumption as to the riskier nature of a management characterized by a president alone whose power is barely questioned. We began by introducing an explanatory variable stating whether or not the group is run by a committee. Then, we ran regressions respectively with our composite indices summarizing the features of the management we want to take into account.

The results from our regressions are presented as coefficients of a complementary log-log regression (and not as hazard ratios). A negative sign must therefore be interpreted as the negative influence of a variable on the risk of dying and enhances the survival probability of the group. Hence, we expect our variables modelling the governance structure to have a positive sign as long as they refer to the power component - composite index mca 8, 'power of the president' mca index, sum of 8 dummies index - and a negative sign in the specific cases of the 'checks and balances' measure - group run by a committee, 'checks and balances' mca index. Table 3 displays in columns [1] to [4] regressions run on the subset of 37 dead roscas. Column [5] and [6] exhibit regressions on respectively 32 and 48 stopped associations.

Exclusively female groups seem to have a significantly longer duration as the corresponding variable is negative and significant under all the formulations of the test.

All six regressions lead to the same conclusion regarding the risks run by groups led by a president alone.

## 5.1 Robustness Checks

Our results are robust whatever the formulation of the hypothesis to test as confirmed by the significance of the following variables: 'Group run by a committee', composite indices on 8 variables - the higher they are, the more power is left to the president and the less checks and balances for the membership - and both indices synthetizing the 'power of the president' and 'checks and balances' components.

We used different specifications of the regression as robustness checks with no reverse conclusion. We ran the same regressions without other covariates and came to the same conclusion as to the higher probability for president groups to fall apart. This was confirmed when we did the same exercise with other subsamples containing a different number of dead groups. We collected data in 2004 on groups which were created on different dates - the first ones starting in the 1960's. This could have produced a biased sample if old roscas were significantly different from younger ones. We therefore progressively reduced the size of the sample of roscas removing the oldest observations. The last regression was run only on the more recent associations, created between 2000 and 2004. Again, the conclusion holds which validates our retrospective sample.

	[1]	[2]	[3]	[4]	[5]	[6]
Started with friends	-0.71 (0.56)	-0.99 (0.49)**	-1.05 (0.53)**	-0.89 (0.50) *	-0.65 (0.58)	-0.79 (0.40)**
Started with neighbours	-0.53 (0.63)	-0.95 (0.65)	-1.09 (0.71)	-0.87 (0.64)	-0.49 (0.73)	-0.63 (0.49)
Started with workmates	-1.06 (0.65)	-1.28 (0.64)**	-1.35 (0.70) *	-1.14 (0.64) *	-0.8 (0.72)	-1.11 (0.50)**
Composed of women	-0.83 (0.43) *	-0.93 (0.44)**	-0.94 (0.47)**	-0.85 (0.45) *	-1.42 (0.49)***	-0.88 (0.38)**
Composed of men and women	-0.52 (0.38)	-0.56 (0.37)	-0.48 (0.38)	-0.51 (0.39)	-0.61 (0.45)	-0.66 (0.31)
Same ethnical group	-0.57 (0.51)	-0.64 (0.53)	-0.52 (0.53)	-0.66 (0.53)	-0.72 (0.64)	-0.66 (0.48)
Run by a committee	-0.76 (0.31)**					
Sum of 8 dummies index		0.15 (0.06)**				
Composite index (mca 8)				0.62 (0.23)***	0.69 (0.22)***	0.45 (0.20)**
Started with relatives						-1.45 (1.02)
Index of 'power' (mca)			0.04 (0.19)			
Index of 'checks & balances' (mca)			-0.77 (0.31)**			
Number of dead groups	37	37	37	37	32	48

*Robust standard errors in parentheses*

*\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%*

Table 3: Complementary log-log regressions with dummies for baseline hazard control and for starting date control.

As final check, we introduced normally distributed<sup>23</sup> unobserved heterogeneity by running complementary log-log panel regressions. As expected, the variables representing a president rosca came out significantly positive which supports our assumption that such groups are more likely to disintegrate.

## 6 Why would people join riskier groups?

According to the survival analysis presented above and given the very low proportion of members taking part in roscas for a fixed number of cycles, it is most likely that groups run by a president alone are riskier - the probability of the rosca dying being higher - than groups run by a committee. Our multiple correspondence analysis also reveals that this aspect of the rosca structure is only one side of the non-democratic management of the group and non-involvement of the members in the management. This leads us to put forward two reasons as to why people would still join president groups.

First, from our field observations, we noticed that trust is not taken for granted in those environments and that acceptance in a group is submitted to conditions. Last part of Table 5 in Appendix 8.2 tells us that committees seem more careful before accepting new members. This is the message conveyed by the three significant differences of means, namely : 'member must be known before joining', 'member must be proposed for membership' and 'member must have their spouse's consent'. We therefore suspect that the committee groups are hardly inclined to accept risky or low social capital agents as new members.

Secondly, the only other reason we can consider would be linked to non-compulsory attendance in president groups. This aspect of the rules could attract individuals whose opportunity cost of time is quite high or who are not tempted into socializing. It is thus likely that people taking part in several groups also join president groups.

We are testing this hypothesis with data on members participation with a logit model where the dependent variable is participation to a group run by a president alone. As our survey was carried in three different areas, we introduced fixed effects removing the area-specific component from the residuals and eliminating the endogeneity caused by unmeasured area characteristics. (Pitt et al., 1999) As errors within those neighbourhoods are likely to not be independent, we used cluster effects that take notice of the correlation between observations coming from the same environment. This produces robust standard errors which would have been underestimated without this correction. Furthermore, the design of our survey was such that the probability of being selected in our sample was different in the three studied areas which could lead to inconsistent estimates<sup>24</sup>. We thus introduced sampling weights for our estimates to be independent of the sample design. We also controlled for ethnic affiliation.

---

<sup>23</sup>It is to be noted that the presence of unobserved heterogeneity was always rejected. We tried to introduce gamma distributed unobserved heterogeneity but experienced convergence problems.

<sup>24</sup>As we have no idea as to the location of groups, which is not necessarily linked to the geographical location of households, we decided not to introduce sampling weights in the duration analysis.

	[1]	[2]	[3]	[4]	[5]	[6]
Female	-1.228 (1.256)	-1.274 (1.358)	-1.229 (1.261)	-1.128 (1.226)	-1.336 (1.130)	-1.218 (1.093)
Couple	-1.928 (1.192)	-1.961 (1.400)	-1.949 (1.252)	-1.880 (1.175)	-2.179 (1.178) *	-2.104 (1.103) *
Female * Couple	1.820 (1.609)	1.957 (1.757)	1.834 (1.649)	1.778 (1.659)	1.871 (1.579)	1.811 (1.592)
Age	-0.029 (0.005) ***	-0.026 (0.011) **	-0.029 (0.007) ***	-0.030 (0.006) ***	-0.038 (0.010) ***	-0.04 (0.010) ***
Individual income	-0.008 (0.002) ***	-0.007 (0.001) ***	-0.009 (0.001) ***	-0.009 (0.001) ***	-0.009 (0.001) ***	-0.009 (0.001) ***
(Individual income) <sup>2</sup>	1.4e-5 (1.5e-6) ***	1.2e-5 (1.6e-6) ***	1.4e-5 (2.4e-6) ***	1.4e-5 (2.5e-6) ***	1.5e-5 (1.7e-6) ***	1.5e-5 (1.7e-6) ***
Owner of the house	-0.183 (0.425)	-0.337 (0.578)	-0.219 (0.430)	-0.220 (0.300)	-0.291 (0.449)	-0.297 (0.332)
Gets a regular wage	-0.945 (0.163) ***	-0.761 (0.324) **	-0.947 (0.150) ***	-0.855 (0.172) ***	-0.956 (0.175) ***	-0.864 (0.201) ***
Simultaneous rosca participations	1.805 (0.898) **		1.619 (0.639) **	1.707 (0.762) **	1.502 (0.760) **	1.595 (0.908) *
Simult. part. * 2nd half of income	-0.479 (1.349)					
Duration in the neighbourhood	-0.002 (0.001) **	-0.001 (5e-4) **	-0.002 (0.001) ***		-0.002 (0.001) ***	
1st Quartile of dur. in the neighb.				0.784 (0.247) ***		0.780 (0.221) ***
2nd Quartile of dur. in the neighb.				0.267 (0.652)		0.249 (0.671)
3rd Quartile of dur. in the neighb.				0.575 (0.413)		0.581 (0.378)
Number of dependants					0.123 (0.058) **	0.119 (0.069) *
Constant	2.952 (1.283) **	2.861 (1.365) **	2.976 (1.300) **	2.241 (1.393)	3.433 (1.280) ***	2.711 (1.462) *
Observations	270	270	270	270	270	270

*Robust standard errors in parentheses*

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 4: Logit with as dependent variable : group run by a president alone.

All the regressions, displayed in Table 4, were run on the whole sample of current or past members' participations. The variable 'age', significantly negative, conveys that, other things being equal, younger individuals are more likely to join president groups. This could comply with our assumption that committee groups are reluctant to accept low social capital agents as new members. The following variables, individual income and its square, are significant and express a convex shaped relationship which complies with our hypothesis as to the opportunity cost of time inciting not to attend meetings and therefore to join president groups. This 'U shape' means that only the richest individuals<sup>25</sup> have an increasing probability of joining roscas run by a president.

One variable, 'Simultaneous rosca participations', is positive and strongly significant. It tells us that if someone is member of several roscas at the same time, the probability that one among those is run by an only president is higher. This also confirms our assumption that if someone has a high opportunity cost of time, he will probably join a group where attendance is not compulsory. In regression [1], a crossed term, which considers that richer agents can afford to take part in more roscas, was introduced among the explanatory variables. The latter is not significant and does not change the significance of the other variables. As a robustness check, we also removed the 'Simultaneous rosca participations' variable with no impact on the other significant variables.

As to the last significant variables, they refer to the regularity of payment of the wage and the duration in the neighbourhood. They all show that people with a low social capital more frequently tend to join groups run by one leader. The 'regular wage' variable is indeed significantly negative in those regressions like the 'duration in the neighbourhood'. While for a member, to belong to the 25% of the people who have been living the shortest in the neighbourhood, the probability of having only one manager in the group significantly increases.

We introduced a new variable in regressions [5] and [6]: the number of dependants of the member. It is positive and significant which means that, other things being equal, having one more dependant increases the probability of joining a president group. This is compliant with the assumption that low social capital individuals are more likely to join such groups. All the previous results withstand. The 'couple' variable which was almost significant becomes significant. Being in couple can, other things being equal, be interpreted as an increase in social capital.

According to these results, it seems reasonable to claim that low social capital individuals are more likely to join president groups. This could be part of the explanation as to why the president groups perform poorly in terms of sustainability. We can indeed put forward that low social capital individuals belonging to fewer informal networks are less able to undergo a negative shock and thus more likely to default. Furthermore, their cost of defaulting is lower in terms of reputation than that of members of committee groups. The latter have indeed stronger incentives to do their best not to renege on their obligations towards the group. The public attracted to president groups is therefore likely to be riskier.

## 7 Conclusion

Our empirical evidence shows that, among the two different kinds of groups observed in Cotonou, roscas run by a president are more likely to fail. These associations are characterized by less

---

<sup>25</sup>As the median income of this sample is around 60000 CFA and the minimum of the quadratic function is at approximately 210000 CFA, the marginal effect of income on most of the individuals of the sample is negative.

participatory functioning and a more concentrated decision process which could influence the sustainability of the group.

Despite its higher risk of failure, this type of group attracts members. Mainly two different kinds of people belong to them: members of other groups who have a high opportunity cost of time and low social capital agents who are reluctantly accepted as new members in committee groups.

This prompts us to conclude that we cannot discriminate between two causes of failure : those directly attributable to the group's organizational design and those attributable to a riskier membership.

This research brings about more new questions than definitive answers. Nevertheless, it reveals that, among those suffering from the imperfections of the financial markets, low social capital individuals are likely to experience more difficult saving conditions. There is therefore a place for the intervention of NGOs or public authorities in this respect.

## **8 Appendix**

### **8.1 Description of our Survey**

#### **8.1.1 Geographical Description**

Vossa's 63 hectares are encircled by stagnating waters and swamps which represent an important vector of disease. This district has not yet been divided into plots, though a long term project was launched during our stay. Vossa is let to itself: the authorities of Cotonou have not yet paved any of its roads even its principal axis. The recurrent and important problem of floods has not been dealt with even if it critically paralyses the area during a few months every year. Enagnon, a dense slum located on the Atlantic Ocean shore, has also received low attention and important sanitary problems have not been tackled yet. Half of its superficies of 60.1 hectares has been divided into plots in 1998.

#### **8.1.2 Survey Methodology**

We selected households according to a random process. In Enagnon we succeeded in obtaining a map of the city and performed a simple selection of a lot according to an implemented random process. In these two districts, many households live on the same lot in semi-detached rooms. Enumerators selected one room on a lot according to a clock-wise direction varying from lot to lot (for the first lot of the day they selected the first room clock-wise, for the second one the second room clock-wise and so on). In Enagnon-plage and Vossa we used a pseudo-random process by which every tenth lot according to a specific direction was picked and then room selections were done in a similar fashion to Enagnon. Overall only 3 households categorically refused to be surveyed and were replaced by other randomly selected households. Enumerators were asked to pass several times and at different moments of the day, until contacts were established in such a way that none of the selected households were skipped. The most qualified of our enumerators also acted as a supervisor and visited many households already interviewed in order to check the accuracy of the responses. Other than that we analysed every completed questionnaire closely. Several appointments were held with every team of enumerators and in case of incoherence or lacking answers we regularly sent them back on the field. Questionnaires often needed successive



rounds of checks until final approval. As mentioned above we stressed that the interview with every single household member had to be carried in his/her sole presence in order to get as precise and reliable information as possible. Fear of divulging information in front of other family members would have led individuals to lie or to refuse answering. On average our four teams of two enumerators completed two questionnaires a day. By taking into account intra-household secrecy, the survey was considerably lengthened by requiring specific appointments with each adult member. Another time consuming factor was the detailed part of our questionnaire concerning groups: we often needed more than an hour for a single group. We compensated every household for their precious time by donating 1500 CFA francs. Finally, with two previous missions, in 2002 and 2003, about eighty group interviews were carried out. We attended regular meetings or met members of their governing body in order to acquire a better understanding of their functioning.

## **8.2 Statistics**

	Mean	Committee	President	Difference		Living rosca	Dead rosca	Difference
Fixed pot time for committee	0.364	0.342 (0.037)	0.407 (0.055)	-0.066		0.375 (0.035)	0.320 (0.067)	0.055
Committee receives pot at the beginning	0.355	0.329 (0.037)	0.407 (0.055)	-0.078		0.365 (0.035)	0.320 (0.067)	0.045
Ruling body gets a wage	0.281	0.130 (0.027)	0.580 (0.055)	0.450 ***		0.271 (0.032)	0.320 (0.067)	0.049
Random rosca	0.653	0.696 (0.036)	0.568 (0.055)	0.128 *		0.646 (0.035)	0.680 (0.067)	-0.034
Order of reception changes between cycles	0.921	0.931 (0.020)	0.901 (0.033)	0.030		0.922 (0.019)	0.918 (0.040)	0.004
Last number of members	29.79	34.17 (2.54)	21.03 (1.88)	13.14 ***		31.25 (2.24)	24.24 (2.44)	7.01 **
Number of members at the beginning	21.20	22.85 (1.48)	17.88 (1.65)	4.97 **		20.73 (1.25)	22.94 (2.71)	-2.21
Monthly contribution	9860	9780 (614)	10018 (994)	-238		9493 (536)	11269 (1496)	-1776
Contribution paid during the meeting	0.736	0.845 (0.029)	0.519 (0.056)	0.326 ***		0.740 (0.032)	0.720 (0.064)	0.020
Activity of indemnity fund	0.134	0.171 (0.035)	0.063 (0.027)	0.108 **		0.160 (0.031)	0.040 (0.028)	0.120 ***
Possibility of getting credit	0.149	0.180 (0.030)	0.086 (0.031)	0.094 **		0.182 (0.028)	0.020 (0.020)	0.162 ***
Possibility of getting solidarity help	0.227	0.292 (0.041)	0.099 (0.038)	0.193 ***		0.266 (0.037)	0.080 (0.039)	0.186 ***
Inquiry before accepting members	0.772	0.800 (0.032)	0.716 (0.050)	0.084		0.822 (0.028)	0.580 (0.071)	0.242 ***
Member must be known before joining	0.570	0.621 (0.038)	0.469 (0.056)	0.152 **		0.583 (0.036)	0.520 (0.071)	0.063
Member must be proposed for membership	0.694	0.739 (0.035)	0.605 (0.055)	0.134 **		0.734 (0.032)	0.540 (0.071)	0.194 **
Member must have their spouse's consent	0.266	0.304 (0.036)	0.188 (0.044)	0.117 **		0.298 (0.033)	0.140 (0.050)	0.158 ***
Observations		161	81	242		192	50	242

*Standard errors in parentheses*

*\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%*

Table 5: T-tests of means differences.

### 8.3 Complementary log-log regression

Cox's proportional hazard model is of the form:

$$\lambda(t|x) = \lambda_0(t)e^{x'\beta} \quad (2)$$

where  $\lambda(t|x)$  is the hazard rate at time  $t$  conditional on a vector  $x$  of covariates.

If we want to take into account the discrete structure of our survey data, we have to transform the continuous time Cox model as showed below.

If we take a cumulative version of the proportional hazard model (where  $\Lambda(t|x)$  is the integrated hazard function at time  $t$  depending on covariates  $x$ ), we get:

$$\Lambda(t|x) = \Lambda(t)e^{x'\beta} \quad (3)$$

By definition,

$$\Lambda(t|x) = -\log(1 - F(t|x)) \quad (4)$$

which simplifies to (1):

$$\log(-\log(1 - F(t|x))) = x'\beta + \log \Lambda(t)$$

The baseline hazard,  $\log \Lambda(t)$ , is designed to be fully non parametric with a binary variable for each interval of constant hazard.

## References

- [1] Ambec, S., Treich, N., 2007. Roscas as financial agreements to cope with self-control problems. *Journal of Development Economics*, 82(1), 120–137.
- [2] Anderson, S., Baland, J.-M., Moene, K.-O., 2004. Sustainability and organizational design in informal groups, with some evidence from Kenyan Roscas. BREAD Paper.
- [3] Ashraf, N., Karlan, D., Yin, W., 2006. Tying Odysseus to the Mast: Evidence from a Commitment Savings Product in the Philippines. *Quarterly Journal of Economics* 121, 635–672.
- [4] Basu K., 2006. Hyperbolic Discounting and the Sustainability of Rotational Savings Arrangements. mimeo.
- [5] Bouman, F., 1995. Rotating and Accumulating Savings and Credit Associations: A Development Perspective. *World Development* 23, 371–384.
- [6] van den Brink, R., Chavas, J.-P., 1997. The Microeconomics of an Indigenous African Institution: The Rotating Savings and Credit Association. *Economic Development and Cultural Change* 45, 745–772.
- [7] Dagnelie O., LeMay, P., 2005. Rosca Participation in Benin: A Commitment Issue. mimeo, CRED, University of Namur.
- [8] Gugerty, M. K., 2007. You Can't Save Alone: Commitment in Rotating Savings and Credit Associations in Kenya. *Economic Development and Cultural Change* 55, 251–282.

- [9] Gugerty, M. K., 2006. Rosca Design, Social Sanctions and Default: Evidence from Kenya. mimeo, Harvard University.
- [10] Handa, S., Kirton, C. 1999. The Economics of Rotating Savings and Credit Associations: Evidence from the Jamaican 'Partner'. *Journal of Development Economics* 60, 173–194.
- [11] Jenkins, S., 2004. Survival Analysis. Draft book manuscript.
- [12] Jenkins, S., 2004. Introduction to the Analysis of Spell Duration Data. ISER, University of Essex.
- [13] Koenker, R., Geling, O., 2001. Reappraising Medfly Longevity: A Quantile Regression Survival Analysis. *Journal of the American Statistical Association* 96, 458–468.
- [14] Kurtz, D. V., 1973. The Rotating Credit Association: An Adaption to Poverty. *Human Organisation* 32, 49–58.
- [15] LeMay, P., 2006. Insurance for the Poor: the Case of Informal Insurance Groups in Benin. mimeo, CRED, University of Namur.
- [16] Pitt, M.M., Khandker, S.R., McKernan, S.-M., Abdul Latif, M., 1999. Credit Programs for the Poor and Reproductive Behavior in Low Income Countries: Are the Reported Causal Relationships the Result of Heterogeneity Bias ?. *Demography* 36, 1–21.
- [17] Wu, D. Y. H., 1974. To kill three birds with one stone: The rotating credit associations of the Papua New Guinea Chinese. *American Ethnologist* 1, 565–583.